

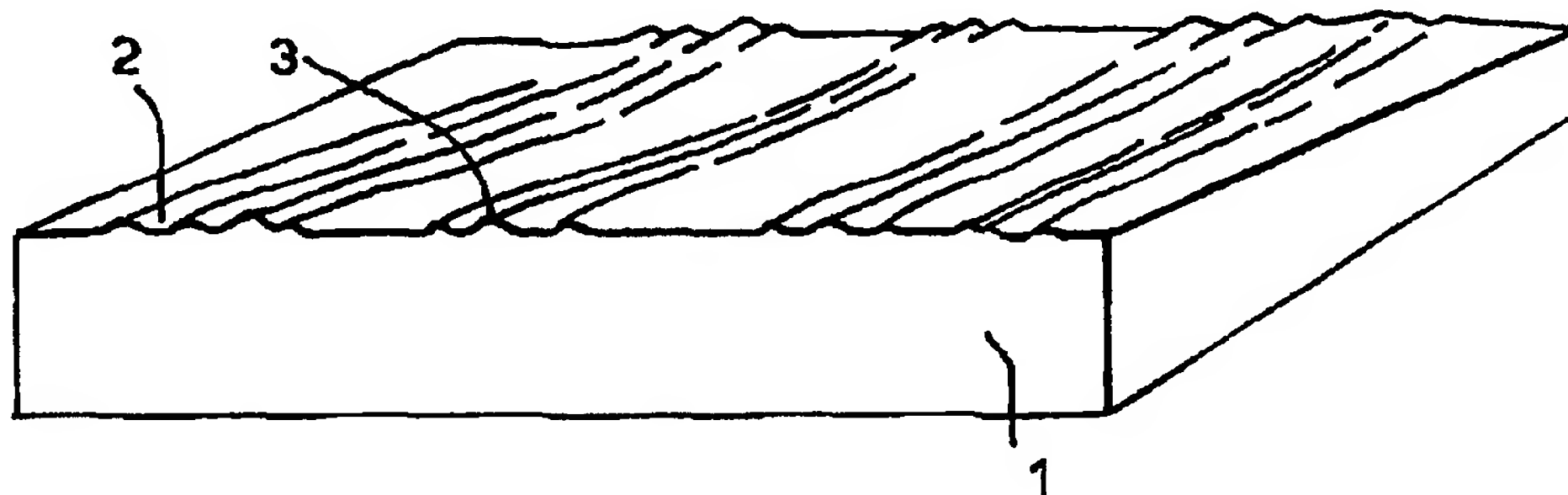


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : <b>B44F 9/02, B29C 43/02, 43/20</b>	<b>A1</b>	(11) International Publication Number: <b>WO 95/12496</b> (43) International Publication Date: 11 May 1995 (11.05.95)
--	-----------	--

(21) International Application Number: PCT/GB94/02419 (22) International Filing Date: 3 November 1994 (03.11.94) (30) Priority Data: 9322626.4 3 November 1993 (03.11.93) GB (71) Applicant (for all designated States except US): LIMBRIDGES LIMITED [GB/GB]; Acell House, 115-116 Buckingham Avenue, Slough, Berkshire SL1 4PH (GB). (72) Inventor; and (75) Inventor/Applicant (for US only): ALBERTELLI, Aldino [IT/GB]; 45 Wyatt Park Road, Stretham, London SW2 (GB). (74) Agent: SMAGGASGALE, Gillian, Helen; Mathys & Squire, 100 Gray's Inn Road, London WC1X 8AL (GB).	(81) Designated States: CA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).  <b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
---	--

(54) Title: FORMING MOULDING WITH SIMULATED WOOD GRAIN SURFACE



(57) Abstract

Synthetic resin mouldings such as panels and doors having an improved simulated wood grain finish are obtained by first coating (4) a part of all of the mould (1) surface with at least one colourant having a colour which is different from the colour of the resin cured and then wiping the mould surface. Unexpectedly, this has the effect of concentrating the colourant on the peaks and high points of the moulding and thus in the valleys of the resultant moulding.

***FOR THE PURPOSES OF INFORMATION ONLY***

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

<b>AT</b>	Austria	<b>GB</b>	United Kingdom	<b>MR</b>	Mauritania
<b>AU</b>	Australia	<b>GE</b>	Georgia	<b>MW</b>	Malawi
<b>BB</b>	Barbados	<b>GN</b>	Guinea	<b>NE</b>	Niger
<b>BE</b>	Belgium	<b>GR</b>	Greece	<b>NL</b>	Netherlands
<b>BF</b>	Burkina Faso	<b>HU</b>	Hungary	<b>NO</b>	Norway
<b>BG</b>	Bulgaria	<b>IE</b>	Ireland	<b>NZ</b>	New Zealand
<b>BJ</b>	Benin	<b>IT</b>	Italy	<b>PL</b>	Poland
<b>BR</b>	Brazil	<b>JP</b>	Japan	<b>PT</b>	Portugal
<b>BY</b>	Belarus	<b>KE</b>	Kenya	<b>RO</b>	Romania
<b>CA</b>	Canada	<b>KG</b>	Kyrgystan	<b>RU</b>	Russian Federation
<b>CF</b>	Central African Republic	<b>KP</b>	Democratic People's Republic of Korea	<b>SD</b>	Sudan
<b>CG</b>	Congo	<b>KR</b>	Republic of Korea	<b>SE</b>	Sweden
<b>CH</b>	Switzerland	<b>KZ</b>	Kazakhstan	<b>SI</b>	Slovenia
<b>CI</b>	Côte d'Ivoire	<b>LI</b>	Liechtenstein	<b>SK</b>	Slovakia
<b>CM</b>	Cameroon	<b>LK</b>	Sri Lanka	<b>SN</b>	Senegal
<b>CN</b>	China	<b>LU</b>	Luxembourg	<b>TD</b>	Chad
<b>CS</b>	Czechoslovakia	<b>LV</b>	Latvia	<b>TG</b>	Togo
<b>CZ</b>	Czech Republic	<b>MC</b>	Monaco	<b>TJ</b>	Tajikistan
<b>DE</b>	Germany	<b>MD</b>	Republic of Moldova	<b>TT</b>	Trinidad and Tobago
<b>DK</b>	Denmark	<b>MG</b>	Madagascar	<b>UA</b>	Ukraine
<b>ES</b>	Spain	<b>ML</b>	Mali	<b>US</b>	United States of America
<b>FI</b>	Finland	<b>MN</b>	Mongolia	<b>UZ</b>	Uzbekistan
<b>FR</b>	France			<b>VN</b>	Viet Nam
<b>GA</b>	Gabon				

FORMING MOULDING WITH SIMULATED WOOD GRAIN SURFACE

This invention relates to the production of synthetic resin mouldings having a simulated wood grain surface.

It is known that products such as panels, doors, door frames, window frames, artificial wooden beams, etc., can be produced with a moulded synthetic resin surface to which a simulated wood grain finish has been applied by effecting contact, usually with pressure, between a surface of a fluid body of curable synthetic resin, e.g. polyester resin, and a mould surface designed to impress the simulated wood grain effect on said resin surface. The curable resin is then normally maintained in contact with the mould surface until it has been cured to the state where the fine detail of the impressed finish is not lost or significantly undesirably impaired when the moulding is parted from the mould.

The desired surface of the mould may be obtained, for example, by forming the mould against a suitable wooden surface. The effect may be enhanced by causing the wooden surface to swell, e.g. by soaking it, prior to its use as the former.

The wood grain-like finish on the synthetic resin moulding may be further improved by suitable pigmentation of the resin and/or by surface treatment.

While the method is widely used and very good results may be obtained, there is still room for improvement in the quality of finish. Furthermore, the finishes currently

obtained normally require at least two further treatments, namely, staining and varnishing, in order to obtain a quality product, and these add significantly to the cost, especially since often more than one staining step is required. Moreover, the product recovered from the mould cannot be sanded because every scratch is highlighted in any subsequent staining treatment.

It has been proposed e.g. in FR-A-2469263 and W092/18341 to achieve a further improvement in the simulated wood grain effect achieved by this procedure by coating the surface of the mould with a colourant such as a pigment or dye, so that when the curable resin is applied against the surface of the mould, the colourant transfers to the surface of the resin and is retained thereon when the cured resin moulding is subsequently parted from the mould.

To achieve a wood grain effect that simulates as nearly as possible its natural equivalent, it is desirable for the colourant to accumulate in the valleys of the moulding. This means that the colourant must be concentrated on the peaks of the mould from which the moulding is obtained. However, in the method employed in FR-A-2469263, the colourant tends to be concentrated in the valleys of the mould and while W092/18341 suggests restricting the coating to the higher areas of the mould, the procedures described therein for the purpose, namely application of the colourant with a stiff pad or use of a carbon paper or coloured transfer paper, have serious

drawbacks in practice because they do not lend themselves to automation, are labour-intensive, require a skilled labour force and/or require the use of expensive materials.

This problem is solved by the process of the present invention which involves first applying the colourant over the mould surface and thereafter wiping the surface. Contrary to what would be expected from such a procedure, it has been found that this has the effect of concentrating the residual colourant on the peaks of the mould surface. This is particularly surprising in view of the disclosure in W092/18341 which teaches that wiping a mould surface on which a colourant has been deposited removes the colourant from the high points of the surface.

Not only is the colourant concentrated on the peaks of the mould surface, and thus in the valleys of the resultant moulding, but it has been found that a greater depth of colourant is found on the higher peaks, thus automatically providing a very desirable gradation of colour tone in the valleys of moulding obtained from the moulds, with the deeper valleys having a deeper tone of colour, as in a natural wood product.

The first step of the process involves applying the colourant over the mould surface. The preferred method involve applying it to the whole, or substantially the whole, surface. A light coating is adequate.

The colourant, e.g. pigment or dye, may be applied as a dry powder or as a suspension or solution in a suitable liquid medium which may be aqueous or non-aqueous; e.g. an

ink. Where a pigment is employed in suspension in a liquid medium the latter may suitably include a binder. Application may be by any suitable method such as spraying, doctor knife coating, brushing, using a cloth, etc. and as the whole or substantially the whole area of the mould surface may be coated with the colourant, this coating step is readily automatable. It is not essential for the whole surface to be coated or for the coating to be uniform but if it is desired not to coat chosen areas of the mould surface, they can be protected by masking.

The second step of the process involves wiping the coated surface of the mould. Where the colourant has been applied dry, e.g. as a powder, no intermediate treatment is required but where it has been applied in combination with a liquid, e.g. as a solution or dispersion, the coated mould surface should first be dried.

The surface should be wiped in a manner as if to remove colourant deposited in the first step; however, the manner of wiping does not appear to be critical and any suitable method and material may be employed provided that the surface of the mould is not defaced or damaged. For example, the wiping may be by means of soft bristle, sponge, cloth or other suitable material. The wiping step, like the coating step, is readily adaptable to automation, e.g. by advancing the coated mould surface under a brush, sponge or cloth rotating about an axis parallel to the plane of the mould surface. Any part of the mould surface not to be subjected to the wiping may be protected by

masking.

Contrary to expectations, the wiping step has the effect of concentrating colourant on the high points or peaks of the mould surface, relative to other areas. While the perceived concentration may be apparent, in that it is the result, at least in part, of selective removal of colourant from other areas by the wiping, redistribution of the colourant over the surface of the mould during the wiping step may also be a contributory factor. In any event, the result is that colourant becomes selectively concentrated on the high points and peaks and moreover, the local concentration of colourant increases with the height of the peak or high point. While the colourant is concentrated on the peaks and high areas, this is not to say that the remaining areas are free of colourant; indeed for some finishes, it may be desirable to leave at least traces of colourant on other areas of the surface. The method of wiping and pressure applied during wiping may be adjusted by trial and error to achieve the desired effect.

If desired more than one colourant may be applied before the wiping step and the colourants may be deposited on different areas of the mould surface or the second colourant may at least partly overlay the first. In the latter case, the wiping step will selectively concentrate the second colourant, where it overlays the first, on the high points and peaks.

Likewise, the step of applying the colourant and then wiping the mould surface may be repeated, if desired, using



different colourants. By this means two or more colourants may be applied and a wide variety of wood surfaces may be simulated. Further variation may be achieved, if desired, by selective removal of colourant from the resultant moulding, e.g. by sanding the high points.

The desired moulding is obtained by bringing a fluid body of curable synthetic resin into contact with the mould surface, preferably with applied pressure, causing or allowing the resin to cure and harden while in contact with the mould surface and then parting the resultant moulding from the mould. If desired the fluid body of curable resin may comprise a layer supported by a backing, e.g. a rigid board or a surface of cured resin. By this means the colourant on the mould surface is transferred to the moulding and since the colourant is concentrated on the high points and peaks of the mould, it will be concentrated in the valleys of the moulding. Moreover, as the deeper valleys will have the higher concentrations of colourant, a gradation of colour which is remarkably similar to that found in the surface of natural wood, is achieved. Furthermore, because the curable resin is in the fluid state when it is contacted with the mould surface, significant quantities of the colourant may be incorporated into the body of the resin as well as on the surface, thereby providing a finish which is more resistant to damage.

The effect achieved by the process of the invention varies with the kind of wood grain surface simulated by the



mould, the colour of the dye or pigment and the colour of the resin and the best results for any particular combination require trial and experiment. In general, however, it is desirable for the colour of the resin and the colour of the dye or pigment to provide a good contrast, in particular a contrast similar to that which exists in real wood, e.g. as in a dark coloured, e.g. black, pigment or dye in the deeper grained areas of the moulding and a paler base colour for the resin which is similar to that of the desired wood effect.

In general, a mould release agent will be applied to the surface of the mould prior to application of the colourant.

The invention is now described in greater detail with reference to one embodiment thereof and with the aid of the accompanying drawings, wherein

Figure 1 shows, in diagrammatic and much enlarged form, a section of a part of a mould intended to produce a moulding with a simulated wood grain effect;

Figure 2 shows in cross-section the surface of the mould of Figure 1 after application of colourant in accordance with the first step of the invention.

Figure 3 shows in cross-section the surface of the mould of Figure 1 after completion of the second step of the invention.

Figure 4 shows in cross-section the surface of a moulding obtained from the mould of Figure 3.

Referring to Figure 1, 1 is a mould having a surface

with valleys 2 and peaks 3 and formed to impart a simulated wood grain finish to a synthetic resin moulding. The mould may be obtained by casting a suitable mould-forming material, e.g. polyester, polyurethane elastomer or silicone rubber, against the surface of a sheet of wood in which preferably the surface grain has been exaggerated by previously soaking the surface of the wood in water to cause it to swell.

As illustrated in Figure 2, in a first step, a colourant is applied to the surface of the mould 1 to form a coating 4.

In a second step, the coated surface is wiped by any of the methods described above such that a residue 5 of the coating is concentrated on the high points or peaks of the mould surface as illustrated in Figure 3.

After completion of the second step, a layer of curable synthetic resin, e.g. polyester, having a colour which is a contrast to the pigment in the residue 5, is applied to the mould surface preferably with the application of pressure to ensure good contact, and is allowed to remain in contact with the mould surface until cure of the resin is substantially complete. By means of the contact of the resin with the mould surface, the pigment is transferred to the resin surface 6, producing the moulding 7 illustrated in Figure 4. The moulding 7 comprises a resin layer principally the valley areas of which are coated or impregnated with pigment. The high areas or peaks 9 of the moulding 7 are the colour of the resin.

As will be well understood by those skilled in the art, the resin layer may be the external layer of a complex moulding which may, for example, include further backing layers of resin at least one of which may include filler and/or fibrous reinforcement. The moulding having the resin layer as an outer face may also include one or more preforms such as of blocks of wood or rigid plastics foam which are located behind and bonded to the resin layer or layers.

The process of the invention provides a simple and readily automatable way of obtaining a simulated wood moulding wherein the colourant is associated with the grain, as in natural wood.

The wood grain effect on the surface of the moulding of the invention is closer to the real thing than that produced by the processes of the prior art where the pigment tends to be concentrated in the valleys of the mould and hence on the peaks of the moulding. Moreover, the product of the invention does not require staining prior to varnishing, and may not require varnishing.

Further, by means of the invention, many colours and/or shades of colour can be achieved in the panel and where the pigment or dye is incorporated into the resin layer the result is more resistant to damage from everyday use than a conventional stain finish.

Yet a further advantage of the invention is that the need for staining is avoided although the product may be stained if desired.

Another advantage is that the product more readily accepts stains and varnishes. This is believed to be due to the presence on or in the resin surface of pigment particles which enhance the ability of the surface to absorb the stain or varnish.

Further improvement may be achieved by sanding or otherwise abrading the surface prior to staining or varnishing. Moreover, contrary to what is found with resin mouldings with simulated wood-grain surfaces and without the pigmentation provided by the process of the present invention, sanding does not mar the finish. In fact, it can enhance the finish in some cases, e.g. where it is employed to remove any pigment or dye from the high points of mouldings.

While the invention has been described with reference to forming the simulated wood grain surface in resin it will be understood that it is also applicable to any other mouldable settable material such as gypsum plaster or a thermoplastics material employed in the heat-softened state.

CLAIMS:

1. A process for the formation of a product with a moulded face having a simulated wood grain finish by effecting contact between a surface of a mouldable body of settable material and a mould surface designed to impress the simulated wood grain effect on said body surface and wherein the mould surface has a coating of colourant, such as a pigment or dye, having a colour which is different from the colour of the resin when cured and said colourant is transferred to the surface of the body of settable material when said contact is effected and retained on said surface when the moulding is parted from the mould, characterised in that the coating is provided by applying colourant to the surface of the mould and thereafter wiping the coated surface whereby to cause concentration of colourant on the high points and peaks of the mould surface.

2. A process as claimed in claim 1 wherein the settable material comprises curable synthetic resin.

3. A process as claimed in claim 1 or claim 2 wherein the steps of applying colourant to the mould surface and wiping the coated mould surface are repeated.

4. A process as claimed in claim 1, claim 2 or claim 3 wherein the mould surface is treated with mould release agent prior to applying the colourant.

1/1

Fig.1.

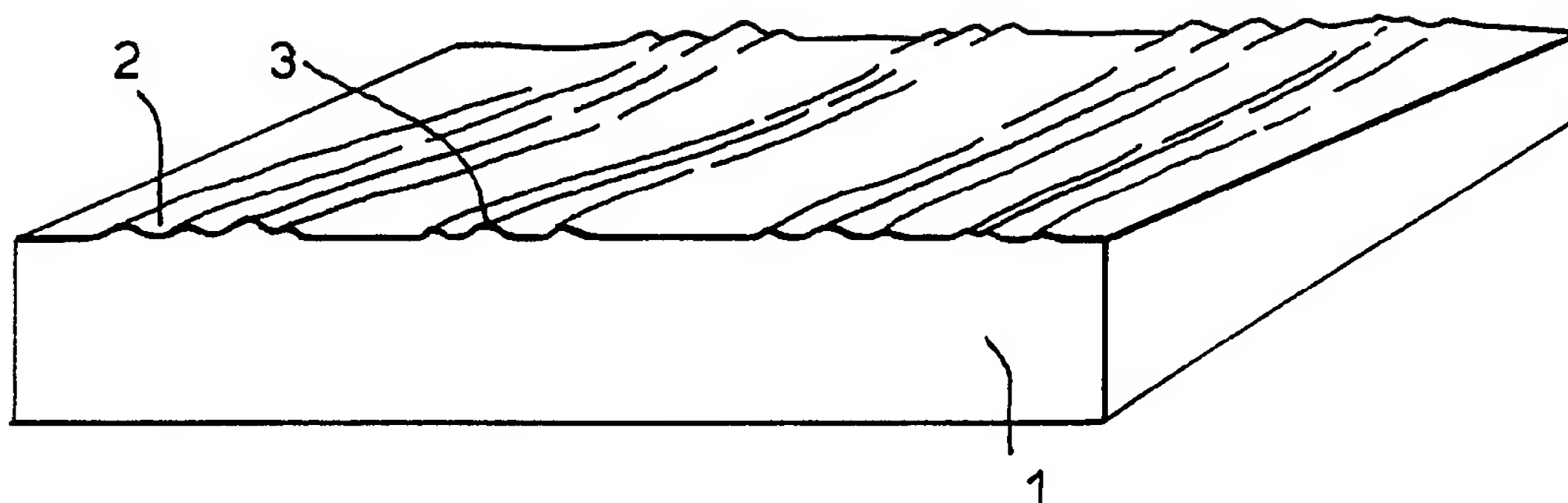


Fig.2.

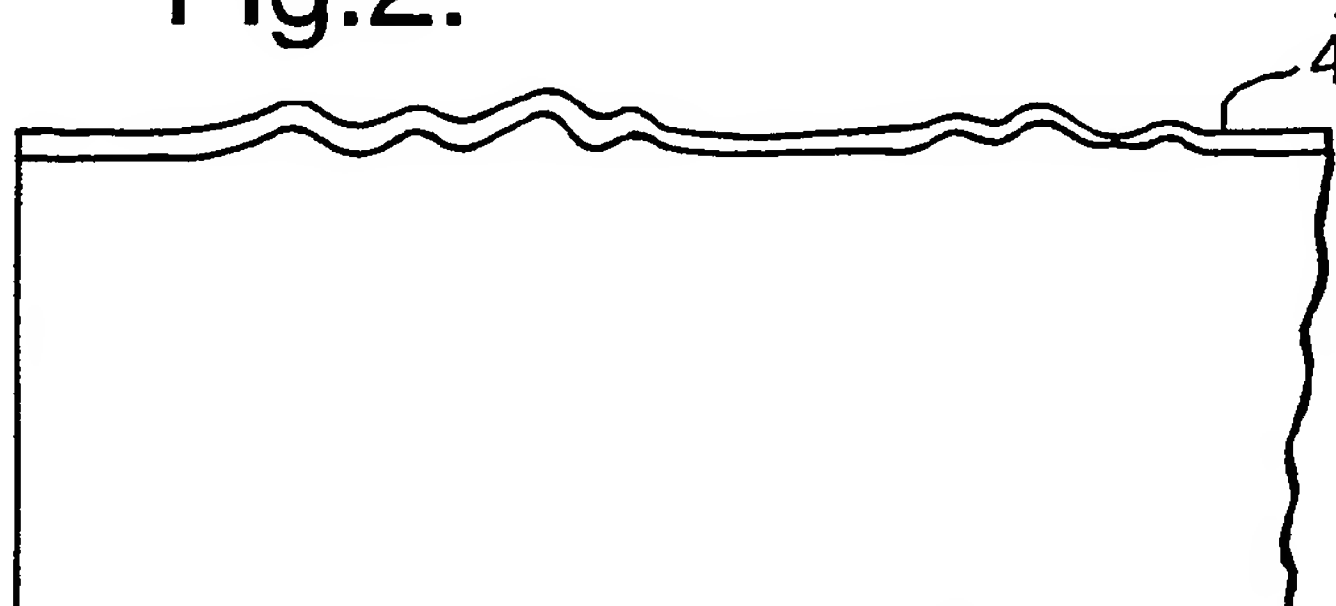


Fig.3.

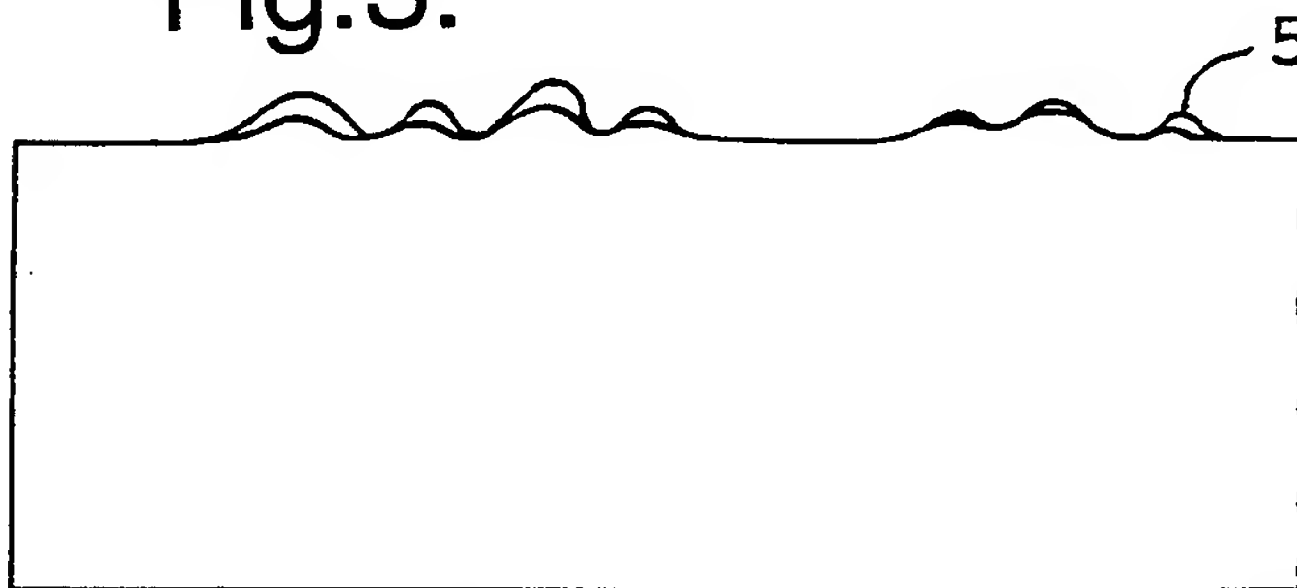
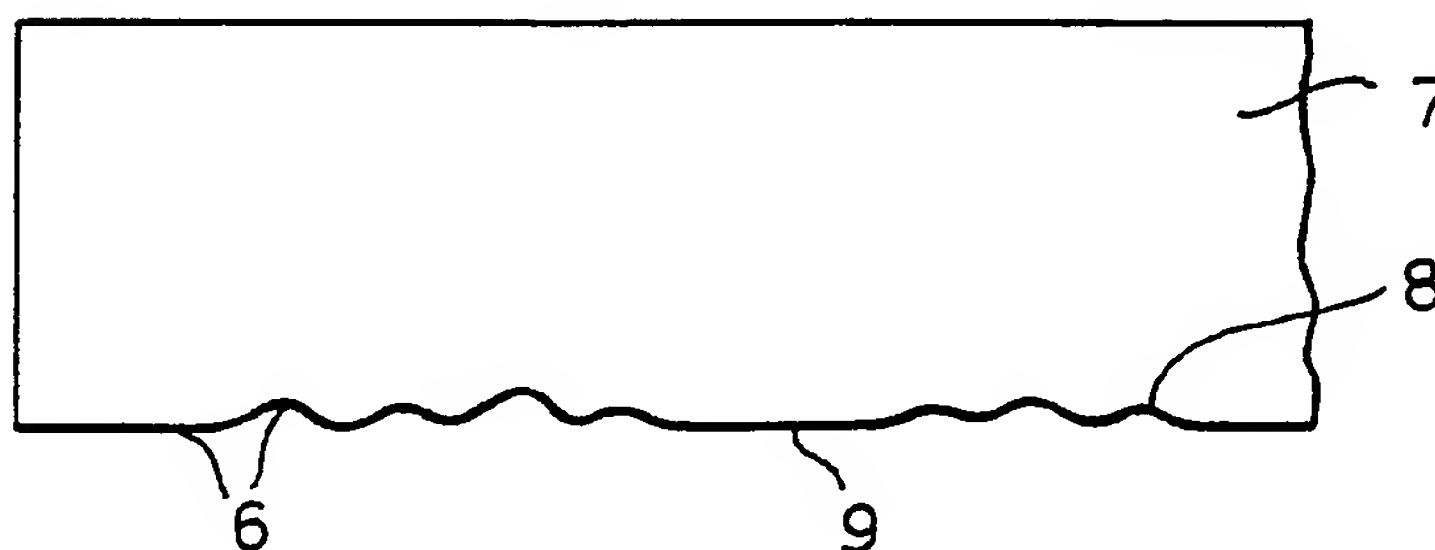


Fig.4.



# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 94/02419

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 B44F9/02 B29C43/02 B29C43/20

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 B44F B29C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A,3 561 103 (DENT) 9 February 1971 see column 3, line 72 - column 4, line 4; claims ---	1-4
Y	WO,A,92 18341 (COMPANY "A" FOAM LTD.) 29 October 1992 cited in the application see claims; figures ---	1-4
A	GB,A,2 063 178 (FORMICA CORP.) 3 June 1981 ---	
A	US,A,4 871 588 (CUDDY ET AL.) 3 October 1989 ---	
A	US,A,3 247 047 (BUCKLEY) 19 April 1966 -----	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

### \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

1 March 1995

Date of mailing of the international search report

17.03.95

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Soederberg, J



# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/GB 94/02419

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-3561103	09-02-71	NONE	
WO-A-9218341	29-10-92	AU-A- 1573592	17-11-92
GB-A-2063178	03-06-81	AU-A- 6314280 FR-A, B 2469281	21-05-81 22-05-81
US-A-4871588	03-10-89	NONE	
US-A-3247047	19-04-66	NONE	